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ABSTRACT

The computer age is redefining photography, and yet notions of photography can still be colored by the 19th-century view that photography is a slice of time and hence, of reality. One inventor of photography called it "nature's pencil," and courts have seemed to agree by traditionally allowing photography as evidence in trials. The core of the news photographer's paradigm is that photography has a moral authority that eludes words. But the pixel (computer data transformations of a photograph) is replacing film with silicon chips, and darkrooms with computers. New technology will test the notions of photography as a slice of reality, a legal document, and as traditional photojournalism. There is a larger societal impact of this new technology, and the traditional ethical discussions regarding words and reporting do not fully encompass digitized computer photographs. Photojournalists, and perhaps society, are facing a "paradigm shift." (Thirty-eight notes are attached.) (RS)

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Photography, Pixels and New Technology: Is There a "Paradigm Shift"?

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Photography, Pixels and New Technology: Is There a "Paradigm Shift"?

> The daguerreotype is not merely an instrument which serves to draw nature....(it) gives her the power to reproduce herself.
>
> Louis Daguerre, 1839

> Luddite, *noun* : One of a band of workmen who (1811–16) tried to prevent the use of labor–saving machinery by breaking it, burning factories etc. — said to have been so called after Ned Lud, a half–witted man who about 1779 broke up stocking frames.
>
> *Webster's New International Dictionary*
> 2nd edition, unabridged

> The world does not change with a change of paradigm. The scientist afterward works in a different world.
>
> Thomas S. Kuhn
> *The Structure of Scientific Revolutions*

During photography's first 150 years the photograph has changed from the immutable daguerreotype to the malleable computer image. The computer age is redefining photography, and yet notions of photography can still be colored by the nineteenth–century view that photography is a slice of time and hence, of reality. One inventor of photography called it "Nature's pencil," and courts have seemed to agree by traditionally allowing photography as evidence. But the pixel is replacing film with silicon chips and darkrooms with computers. New technology will test the notions of photography as a slice of reality, a legal document and as traditional photojournalism.

While we cannot be Luddites about this new technology that helps free journalism from deadline pressure, we must be aware of the potential abuses. There is a larger societal impact, and the traditional ethical discussions regarding words and reporting do not fully encompass digitized computer photographs. This paper will grapple with the qualitative and ethical concerns of photography's new technology and suggest that photojournalists, and perhaps society, are facing a "paradigm shift." [1]

Of Paradigms and Photographs

In 1962 Thomas S. Kuhn argued that history can show how new sciences emerge and mature into a professional consensus. He used the word paradigm, meaning pattern, and elevated it to encompass "a constellation of beliefs, values, techniques shared by members of a community." He addressed scientists, but paradigms sprouted in other disciplines due to the elegance of Kuhn's book, *The Structure of Scientific Revolutions.* Kuhn distinguished paradigms from theories and said, "a paradigm governs not a subject matter, but rather a group of practitioners." This definition can easily evoke the working consensus of photojournalists, although they are characteristically a vocal group who do not always agree with their editors. Disagreement within a group did not bother Kuhn.[2] For Kuhn, the paradigm "is what the members of a scientific community, and they alone, share. It is their possession of a common paradigm that constitutes a scientific community of a group of otherwise disparate men."[3]

There is a paradigm that unites news photographers and distinguishes them from other journalists in part because photographers are visual reporters, and editors are word–oriented and do not always understand the visual grammar of photography. Photojournalism's dependence on science has been a barrier in the newsroom; photographers are often more comfortable in the darkroom than in the newsroom. This isolation, however self-imposed, is reflected in a 1984 survey of news photographers that found 40% of the respondents were not satisfied, and cited lack of opportunity of advancement as a main reason. Photojournalists tended to be younger than their verbal counterparts; they left the profession at an earlier age. In response, news photographers have been very active in professional organizations that serve as support groups. As Beverly Bethune confirmed, news photographers have formed strong allegiances to each other across the country through professional organizations and contests aimed at acknowledging new talent. Two organizations have provided a model for working photojournalists: the National Press Photographers Association and the American Society of Magazine Photographers. Membership is limited to working photographers and both organizations publish magazines and special reports that address the concerns of photojournalists. From these associations there is a working paradigm among photojournalists, which in Kuhn's words "proved able to guide the whole group's research." [4]

The core of the news photographer's paradigm is that photography has a moral authority that eludes words. Readers assume that writers can selectively slant facts and even lie. But photographs address a different unit of belief: "seeing is believing," "believe half of what you hear and all of what you see." As Susan Sontag has observed, "the picture may distort, but there is always a presumption that something exists, or did exist, which is like what's in the picture." Photography has a believable innocence, deserved or not, that is visceral. According to Sontag:

> Whatever the limitations (through amateurism) or pretensions (through artistry) of the individual photographer, a photograph — any photograph — seems to have a more innocent, and therefore more accurate, relation to visible reality than do other mimetic objects. [5]

The new, computer–based technology of photography threatens this paradigm for many photojournalists. Change is always difficult but is there a "paradigm shift" coming?

Kuhn's critics have asserted that his provocative theory of "paradigm shifts" does not truly address why a community changes loyalties to intellectual cognition, and that a paradigm shift can over-simplify intellectual history. And yet few have dismissed Kuhn's notions of change outright. They may question his ambitious scope, but the theory of change in a group's Weltanschaung continues to nourish disciplines beyond historians of science. Kuhn is valuable for trying to put the technical changes of photography into a theoretical framework. [6]

The stages of a "paradigm shift" were inspired by the influential, yet arcane, world of science: first there are feuding schools of thought; the second stage centers around a sudden achievement, which can resemble the gestalt psychologist's flash of perception that sees a new whole amid chaos; the third stage sees schools dissolve leaving a new generation of scientists who share a professional consensus not possible in the first stage. This is not an easy process, admitted Kuhn, "history suggests that the road to a firm research consensus is extraordinarily arduous." The new technology of pixel–based photography is a sweeping technological achievement because it throws out the entire process of film, the medium photography has used for over 135 years. This might emphasize key problems within photojournalism; and the response may be a new working consensus or paradigm.

Kuhn's world of paradigms is attractive in view of photography's technological mystique. The creative power of photography is often obscured by its technology, and unfortunately this has often repelled the poet/reporter in favor of the photo–technician who emphasizes "shop talk" over "shooting." It's easy to forget that the camera is actually a glorified shoe box. Any dark box or room, like the camera obscura, will show a snapshot of the outside world so long as there is a small opening on one side of the darkened box or room. Leonardo da Vinci described nature's phenomenon. Through the centuries photography has been a problem of chemistry: how to snatch the picture from the darkened box so you can hold it in daylight. Since photography's inception, generations of photographers have danced around the chemical requirements and limitations of photography. Film and equipment dictated what photographers could and could not envision.

Different schools emerged that argued different approaches to photography. Artists had vastly different perspectives from photojournalists and both groups often viewed each other with suspicion. The nineteenth century produced schools of photography devoted to pictorial and allegorical photography. Other groups argued that sharp focus and reality were the natural domain and that photography could not be compared to painting. "Photography is not a fine art because it can invent nothing. It can give us a true record or a muddled and falsified one, and that was the only choice," observed historian Neil Harris. The twentieth century added another school of photographers who used the camera to report news events and probe reality for publication. Each school had its own aesthetic and sense of truth.[7]

However, published photography was noted for a particular characteristic: artless recording. Harris observed that the nineteenth and early twentieth century magazines and newspapers continued to favor artists' drawings. Art illustrations abounded in *Fortune, New Yorker, Collier's,* and the *Saturday Evening Post.* The exception was one area, according to Harris: news, documentary and travel stories. This observation supports a paradigm of photojournalism that argues published photography has an integrity that is distinct from art or illustrations. [8]

The 1980s Revolution in New Technology

Photography has been based on film for 135 years — but new computer technology is based on pixels, which is a computer term derived from "picture elements." Pixels are computer data that

translate the subtle, continuous tones of a photograph into a complex series of ones and zeros, the basis of computer language. Once the numbers are crunched by the computer, the photograph simply becomes another computer document that can be altered and revised — in revolutionary ways.

This revolution is marvelous for saving time and money. It controlls the deadline pressures of color reproduction because it reduces the headaches of assembling color negatives for reproduction. But perhaps most importantly this new technology increases color quality. The media giants in newspapers and magazines can relay their pages via satellite to printing sites across the country in less time and with extraordinary color quality and less deadline pressure.

The concern among photojournalists and free–lance photographers is that this new technology has redefined the photograph. Because pixels are computer data, they can be moved, cloned and colored. This new technology turns all photographs into pixel-based images with a new precedent. Anyone with access to the computer has unlimited access to altering the original image. In effect, photographs can lie with greater ease than ever thought possible. It's built into the digital process.

During the 1980s large newspapers and magazines began to invest in computers to control color reproduction and ease deadlines — with price tags of approximately $2 million each (the leading companies are Scitex of Israel, Hell Graphics Cromacom of West Germany or Crosfield Electronics of New Jersey). These powerful computers are the main reason why *USA Today* can have over 35 printing sites across the country and yet be known for its color reproduction. One may have reservations about the Carmen Miranda color splashes of *USA Today,* but its technical quality controlled by Scitex is flawless.

This revolution is not elitist; today's personal Macintosh computer allows photographs to be scanned and converted to pixels. The quality is still coarse, but the technology is improving and most Macintosh users are optimistic. "Almost anyone who wants to can become accomplished at digitized image manipulation," said a New York computer art director to *Photo District News.* "These low–end systems, within broad limits, can give you high–quality output at a most attractive price — which opens some very large markets." One computer graphics instructor told *Photo District News,* "Photo retouching, within the next five years, will be done digitally —both color and B&W— on an

inexpensive personal computer." Market forces are accelerating the popularity of pixel-based photography. [9]

In essence the computer has turned photography into controlled liquid, where images can seamlessly blend into a realistic whole. Traditional cutting and pasting of photos has always been available, most will argue, but what's often ignored is that the old cutting and pasting just wasn't that good or believable or economically feasible — it was time consuming and required photographic skill. But now the chain saw has been replaced by a surgeon's scalpel because pixels are smaller than film grain and they can be cloned, moved and colored. Computer manipulation is seen instantly on the computer screen and does not require a darkroom. Computer time is expensive, but not always as expensive as reshooting images on deadline. Most importantly, computer alterations are undetectable and available to anyone — you don't need the photographer to manipulate an image.

The pixel's effect on photography is largely a quiet revolution because it's shrouded in computer jargon and the mysteries of printing reproduction. Yet its potential affect on readers, and the next generation of photographers, is enormous. Pixels can create realistic images that never existed; they can combine people together who have never met; they can easily turn a sense of reality into what one magazine art director described as "a very slick form of collage." The new image can be more aesthetic than the original image; in fact, reality is a surprising letdown. Raphaele of Raphaele/Digital Transparencies, has said "If an image has been done in my studio and done well, there is absolutely no way to see where it has been altered even if you use a magnifying glass. Absolutely no way, because you're dealing with the same original grain."[10]

The Ethical Questions

Professionals who use the technology are quick to point out that they would never alter a news photograph and that manipulation is confined only to color correction, cropping and lightening or darkening areas of the picture just as a darkroom printer might do.[11] However, there have been some growing pains. In 1982 *National Geographic* digitally moved a pyramid of Giza so the photo could fit the cover format. Other publications have manipulated covers, but "moving a pyramid" became the new metaphor for pixel–based photography. If there is any consensus among users it's

"don't move a pyramid." However, ethical discussions at professional conventions often revert to shop talk on how to work the machines or transmit deadline photos.

The Pandora's Box is that photography is everywhere, and manufacturers have great incentives for sweeping both the high and low ends of publishing. "We've had the ability to alter photographs for a long time, and the fact that we're now in digital format doesn't change the issues. It's no more an issue now than it's ever been," says an editor of the *Chicago Tribune*. Hall Buell, assistant general manager for news photos at the Associated Press, believes these ethical questions are a "non–issue." However Buell says, "The ethical thing may become more an issue when we shoot pictures digitally. And the reason I say that is because there is not an original picture when you shoot an electronic photo. The changed picture becomes the original." [12]

Professionals in the field who use the new technology say that ethical people won't manipulate photos. This may be true; but can we sensitize all professionals to the issues as quickly as one can clone pixels? Many professionals who are serene about how they use the computers have expressed concern about the technology getting cheaper. "The very real danger is that this editing power of digitizing photos and altering them is coming to personal computers," said George Wedding, director of photography at the *Sacramento Bee* and organizer of a national conference on new technology. "When it gets into that realm, and out of the realm of $350,000 machines, then it is integrated into a whole new level of people. Those people may not have training or exposure to traditional values of documentary photography." [13]

But documentary photography is already altered on the computer. Collins Publishers produces documentary books and regularly alters the cover photos. *A Day in the Life of America* documented everyday life, but the cover photo didn't fit the cover format and so the editors moved a cowboy closer to a tree and enlarged a moon. *A Day in the Life of Canada* featured children on lush green grass, but the original lawn had been blanketed with dandelions. ("I had no idea that was coming," says photographer Roger Ressmeyer of the change in his photo.) *A Day in the Life of California* features a surfer but the editors tilted and cloned the top of the surf board to fit the cover. A spokesperson for Collins Publishers told the *Wall Street Journal,* "The cover sells the book. You want people to stop and notice. I wouldn't say any of us feel particularly great about doing it, but it seems

to be a technology that others use." [14]

Alteration of Cover Photos In Magazines

Despite Collins Publishers, there is a general consensus that news and documentary photography should not be touched; but that illustrations, artistic and advertising photography have a free reign. However, magazine covers might test this consensus. Several realistic covers have been digitized for their graphic design — but the altered or composite covers looked documentary. A *Conde Nast Traveler* cover in 1988 featured New York City's Chrysler Building with planes sky writing the words "New York City." The picture look realistic, but it was a composite, using three separate images. According to the art director, air regulations would have prevented planes from actually flying that close to the Chrysler Building. *Conde Nast Traveler 's* January 1989 cover digitized surrealistic water splashes on a woman diver. Readers responded negatively, according to the art director: "Readers wrote in — people from all over — saying 'I know that a woman who's diving into the water can't make a splash like that. How could a photo be so contrived?" *Spy* magazine digitized Donald Trump in a tuxedo for a cover because they knew Trump would never pose for them. *Metropolitan Home* alters or combines photographs of homes and interiors.[15]

Where are the gray areas? Most of the confusion lies in the traditional notions of illustration and feature photography. For example, a *Newsday* editor told the *San Jose Mercury News* that although news photos would never be touched, a scenic feature with distracting telephone wires would be altered to remove the telephone wires. Removing telephone wires in a scenic is controversial among many magazine editors. *Newsweek's* picture editor told the *Wall Street Journal* that they recently combined two celebrity photos together since the actors, Dustin Hoffman and Tom Cruise were on opposite sides of the country. *Newsweek* said that the two actors had given their permission. But should "permission" enter in the discussion of combining portraits? In effect, do Hoffman and Cruise decide how feature photography is handled at *Newsweek*?[16]

This technology is raising new questions in picture editing. The ease of making changes on the computer screen makes spontaneous ideas of alteration quickly possible. At *National Geographic's World* , a magazine for children, one editor asked to digitally remove — not crop — a large butcher knife from a table because she didn't like a large knife in a photo without "explicit adult supervision."

According to the illustrations editor, the knife remained because "my argument was 'this is reality." The computer allows a new editing procedure: any editor can now casually ask for substantial alterations because quick and relatively easy changes are built into the computer technology. Traditional photography demanded concerted effort, time and photographic skill to remove items beyond the mechanical technique of cropping. The director of production at Meredith Corporation observed:

> If you were to take your photographs that you saw as reality and were to evaluate your photo and have them on a (Scitex) system and say to yourself, "Gee do I really like this or do I want to move that chair? You're going to move the chair because any artist is just not going to be satisfied with what they do. The art director sees it as his next opportunity to create something better. [17]

The First Wave of Concern: Free–lancers in the Marketplace

There is some fear among commercial and free–lance photographers, and the confusion might contribute to a "paradigm shift" among all photographers. Many photographers are asking a basic question that applies to any image: who owns the copyright of the new altered photo? Spectacular pictures are now being formed from manipulated images. "You alter his photograph and he no longer owns an original picture that is the picture people remember," observed *Time's* picture editor Michele Stephenson. Free–lancer Roger Ressmeyer sold an image to an art director, but the digitally altered image looked better than the original. "People want the altered image and I don't have it," said Ressmeyer. "My original is worthless."[18] Before computer technology, photographers did not concern themselves with having worthless originals.

Computers can also store images, which in Ressmeyer's view, "makes it easier to overlook the fact that the creator has the copyright." Attorney William McGrath of Chicago has observed that the 1976 Copyright Act applies to the untested waters of digital photography, but "since the courts have yet to be confronted with a case involving the creation of photographs through digital imaging only time will tell." New care must be taken in contracts, but McGrath writes that "the chicanery made possible by digital imaging technology may make proof of infringement a challenging task." [19]

Physical control of the original image was one of the first protections of copyright protection. But the computer can store originals infinitely. Vince Streano, a chapter president for the American

Society of Magazine Photographers, fears there will be less demand for photographers:

> They can modify the color of our sunset, add trees to the foreground, change your sky. And then they can then make an 11x11–inch transparency: in effect, a new original. Then they can take these images and rapidly transmit them around the world." [20]

Video disk technology, which now can store 54,000 images on one disk, is another concern of photographers. "I think photographers have been extremely alarmed knowing that video disk technology can store literally a life's work on one disk," said Tom Kennedy, director of photography for *National Geographic*. Kennedy compares the dissemination powers of video disks to the early music industry. "In a certain sense we have to get some pretty profound copyright protection issues that may be somewhat analogous to what went on in the music industry when recording technology and 78 records came on the scene," said Kennedy. "I think the photography industry has got to wake up and realize that these are the same issues and come to decisions. The technology exists — what do we do with it? We're still in our infancy."[21]

From Photography as Evidence to Photography as Illustration

Clean, eye–grabbing images are a hallmark of illustration photography; has it eroded news photography? The *St. Louis Post–Dispatch* digitally removed a Diet Coke can from their photo of, ironically, the 1989 Pulitzer Prize winner in news photography. Was this a news photo? It was treated as an illustration photo since an offensive pop can was removed. *Post–Dispatch* editors regret the digital alteration of the photo, but this example again points to the ease of digital manipulation. On the computer, the differences between news, feature and illustration are easily blurred.[22]

Celebrity journalism raises a host of questions among magazine editors and their use of celebrity photos and illustrations. The satirical magazine *Spy* has digitally pasted the faces of celebrities onto models for three of their covers. "And so by doing this you don't have to toady to the person you're writing about," said editor Graden Carter. "You can have a cover story about somebody with their face on the cover without having to get their permission. And that's what journalism is all about — at the same time I think it's a bad idea." Carter emphasized that his satirical magazine has freedom that news or feature magazines do not.

"When celebrities have that kind of power over a magazine they control the magazine in a certain

way, especially in the way the magazine reports about them," said Carter. *People Weekly* picture editor, M.C. Marden agreed to a certain extent. "Oftentimes there are people you can't get pictures of because if they agree to do a story, they'll only agree to do it with a certain photographer and then they buy the photographer out," said Marden. "You have to say what the tenor of the article is going to be before they'll let you have the picture." *Time's* picture editor Michele Stephenson noted, "Politicians and businessmen want to be in control of their image — it's getting ridiculous — and harder and harder to get these people to be spontaneous as they learn to control things." [23] *People Weekly* does not combine photos of celebrities. "We want to present the real person," said Marden. "The whole point of *People* is to get into somebody's house and see how they really live, what the family looks like, what the hobbies are, what the backyard is. I don't think we'd do what *Spy* does."[24]

The Underlying Paradigm of Photojournalism

The distinguishing difference between photojournalism and other photography is its inherent credibility: a trusted photojournalist will interpret, but not falsify, the pictures of an event. In contrast, art (and studio) photographers are freer to pose and manipulate. Edwin Martin's essay "Against Photographic Deception," summarizes a natural tension between art and documentary photography by discussing the setup shot. Art photographer Garry Winogrand asked, "What difference would it make if I said that every photograph I made was set up? From the photograph you can't prove otherwise. (What is really important) is the photograph, not how I do anything." Martin disagreed:

> Surely Winogrand is wrong about this. I have been disappointed to learn that photographs I admired had been arranged by the photographer and were not the description of life I had thought. If Winogrand is right, there is not good reason for my disappointment. Part of the reason for my disappointment was a feeling of having been fooled by false pretense. Winogrand's contention is that we should not care about origins, we should not care about how the picture was made. But if the surrounding context of the picture has the force of asserting that it describes reality, then Winogrand is essentially saying that we should not care about truth. In many situations, though, truth matters a great deal. [25]

Cultural analysts of photography have rightfully argued that photography is an art of selection. As Snyder and Allen have cogently argued, "The image is a crafted, not a natural thing." Photographers always interpret through a wide variety of choices in equipment, composition and lighting. As Bob Craig observes, "Theories of objectivity, naturalism etc. are, at least in part, ideologies that mask the

fact images are framed, manipulated, constructed, and oriented by particular interests." Although photography is a mechanical process, it does not automatically reproduce reality. In effect, says Arthur Asa Berger, "a picture is always an interpretation of reality, not reality itself."[26] Interpretation and style is part of all photography. And yet, photography will always command more credibility than other art forms.Why can a hasty snapshot have more credibility than a painting that achieves photo–realism?

The undeniable difference between photography and other arts is that a photograph is a record of *something that reflected light.* A photographer may interpret, but *something* had to reflect light. This is the crucial difference — the underlying paradigm — that fuels emotional power to photography. Despite human intervention, a photograph is based on photons of light, and film is its record. "The irreducible difference is that a photograph is a record of something that existed in front of the human eye," said Tom Bentkowski, director of design at *Life* magazine.[27]

The Paradigm of the Ethics of Photojournalism

Concerned editors and photographers draw the lines in how much a photographer interprets, manipulates and poses. *Drawing the lines* of intrusion is as important as the choice of subject. Perhaps the most classic example of drawing the lines came from Rivers and Schramm when they asked journalism students about the limits of posing. Students had no objections to a photographer rearranging leaves in a scenic picture. However, these students became indignant when a photographer gave advice to carry a broken tricycle in a car trunk for use in news events involving a child; the tricycle would "provide foreground interest." Rivers and Schramm paired these two events onto *the same continuum:*

> One of the most damaging aspects of photojournalism is that too many of the people who make pictures for the mass media treat the truth casually. They become accustomed to arranging pictures and do not know when to stop. *The time to stop is at the beginning — with the innocuous little scene of the leaves.* [28] (emphasis added)

Setup shots passed off as genuine candids is a common concern among photojournalists. A special report from National Press Photographers Association in 1988 surveyed photojournalists and asked "What do you think is the biggest ethical problem photojournalists face?" Setup shots were cited as the biggest ethical problem. One photographer wrote, "I know it is very difficult to make the

perfect photo at the perfect moment without directing the subject. But are we in danger of making the 'perfect pictures' that no one can believe?" Another photographer asked "Am I being a dinosaur by not setting up photos? Am I wrong?" [29]

Digitizing photos adds a new urgency to the widespread concern of setups. A new working consensus is not widespread because the new technology is not widespread. *National Geographic* contract photographer Sam Abell said, "A setup should look set up. It's when you set a picture that purports to be candid — It ruins it for me." Abell pointed to the digitized cover of *A Day in the Life of America*. "They're fictionalizing the situation to make it more palatable. It's the same thing *A Day in the Life of America* did. The picture is good but it could be better. And we are going to make it better for the marketplace," said Abell. [30] In response to an article discussing Scitex and newspapers, White House photographer Peter Souza wrote, "*National Geographic* photographer James Stanfield presented a stunning slide show of his obviously candid work during the past 20 years. Yet one of the first questions from a member of the audience was 'How many pictures were set up?' Stanfield was certainly not a deserving recipient of that question. But our profession was. Now, before it gets out of hand, let's stop the next question from being, 'How many pictures did the Scitex create?" [31]

The distress that many photojournalists feel about setup shots is exacerbated by digital manipulation on the computer. While the harm of manipulating news photography on the computer is clear, it's on the same continuum as staged setups found in feature assignments. Editors should questions their fondness for promoting an event through posed setups and use photographs for documenting the actual event. When editors and photographers are too comfortable with staged assignments, they may become more dependent on illustration photography — which clearly invites digital manipulation.

What is at stake is the credibility of all photography in the reader's mind. Commenting on set up photos, an editor from Maine said, "A tolerant, forgiving press is probably the biggest threat to the photojournalist.The ethical formula for photojournalists is simple: tell the truth through your work, and tolerate nothing but the same from your colleagues. And don't be afraid to be a zealot about it." [32]

The Spread of New Technology

After studying scientific revolutions, Thomas Kuhn's observed, "new paradigms are born form old

ones (and) they incorporate much of the vocabulary and apparatus, both conceptual and manipulative, that the traditional paradigm had previously employed." Many of users of the computer technology in newspapers have publicly stated that "technology changes, ethics don't." However, pixel–based photography is not merely a new wrinkle on production technology. It is too convenient for news professionals to say that this is business as usual. Although this new technology is now somewhat buried in the production departments, the effects will manifest as personal computers and still video cameras, based on pixels, become commonplace to the public.

Competition and traditional market forces can be a strong test of this new technology, especially among users of different orientations, such as graphic arts. Many magazines, which often blend journalism with illustrations, also have this high tech tool. An art director for a new magazine *Sports Illustrated for Kids* digitizes the covers according to his artistic, professional background. "I've never dealt much in the way of reality. That was pretty much a fantasy," he said when talking about cover illustrations. The business of selling pictures is big in both this country and Europe. A recent *Editor & Publisher* report observed the steady growth of photo services, "More and better photos are being demanded as newspapers strive to be more visually attractive and to improve their feature sections."[33]

The potential abuses, however, can reach larger arenas of integrity. In a study of the government's national security statutes, Caroline Dow concluded that the broadest government restrictions concerned the use of cameras. "Pictures are the most damaging because they are often the most accurate and widely disseminated rendition of information," observed Dow. "These are also the attributes that make pictures the most powerful check on some government activities." Perhaps. Photographic proof made the headlines in January 1989 when the United States shot down two Libyan planes. Were the Libyans armed? Libya said no, but the newspapers cited photographic evidence by the Reagan administration, and newspapers could print, "Photos show Libya lied about planes." As knowledge of digitization spreads, photography might loose its moral authority and become the equivalent of "it's your word against mine." [34]

Who will set the standards of digitized photography — advertising, personal computer users, governments, journalism? Photography's new technology is still a secret of sorts. As Sissela Bok has

observed, "Control over secrecy and openness give power: it influences what others know, and thus what they choose to do. Power, in turn, often helps increase such control. "[35] We cannot be cynical, and outright accept the fears subscribed by the notion that when a technology is invented it will certainly be used. However, we need a wider dialogue that includes more than the users of this technology.

Conclusions on a "Paradigm Shift": Reflected Light vs. Liquid Pixels

As Kuhn observed, "the world does not change with a change of paradigm. The scientist afterward works in a different world." Photographers and editors are facing a new world whether they wish to acknowledge it or not. And although "ethics do not change," the marketplace situations that test integrity do change. Dramatic photography is more in demand today. Kuhn's provocative, if slightly vague paradigms, can give photography a basis for grappling with sudden change. Kuhn points to key questions that professionals should ask themselves:

> What does the group collectively see as its goals? What deviation, individual or collective, will it tolerate; and how does it control the impermissible aberration? Scientific knowledge, like language, is intrinsically the common property of a group or else nothing at all. To understand it we shall need to know the special characteristics of the group that creates and uses it. [36]

A paradigm shift creates a distinctly new way of thinking about old problems. Photography's conversion from film to pixels is not merely a technological innovation. It cuts out photography's 150–year–old requirement that a real subject is needed to *reflect light*, which freezes the subject in time and space. Instead, the computer image needs only the final product: the film. Part of the paradigm shift is that photography is no longer a photo–mechanical process that has limits of interpretation set by film, camera and photographer. Photography is now a computer process that has no limitations beyond computer memory (power) and budget.

Traditional photography's uncompromising need for reflected light has been the irreducible difference between photography and the other mimetic arts. Photographs are symbols that are chained to reality — they need *something* to exist in front of the human eye. Words, painting and sculpture do not need objects to actually exist beyond the mind.[37] The paradigm shift occurs when one jumps from the constraints of *film–based* photography to the infinite power of pixels. Cultural

analysts have argued that photographs are interpretive because the photographer makes choices in film, angle, light and composition. But there is a limit to how abstract you can become before a photograph becomes an contrived piece of "self–expression." And yet by its very definition, a photograph *cannot be entirely interpretive* because it needs *something* to reflect light. The paradigm shift is that *unlike film–based* photography, the digitized, pixel–created photo is pure abstraction — pure interpretation — but no one can detect it.

As a society we are still operating on the original paradigm of film–based photography. However, the computer image now creates realistic scenes that exist only in the imagination. Pixels transform the photograph into controlled liquid that can flow and change from one abstract idea to the next. Reality is not a question because it is not part of the process. The computer is not a camera that needs reflected light; the computer is divorced from the immediate object or event. The paradigm shift is that essentially there are no longer any boundaries between the real and the manipulated. Because pixels mimic film grain, the photograph is transformed into an image painted by numbers — numbered pixels — yet retain the look of *film–based* photography. The paradigm shift is that photography can lose its moral authority if society decides that the photo no longer has any connection to reality.

Educators need to grapple with the many implications of computer photography because a new generation of media consumers will not have the comfortable paradigm of film–based photography. For example, the full discussion of pixels should not merely equate manipulating pixels with traditional cropping, burning and dodging. Moreover, the marketing of this new technology is ahead of any consensus of its ethical uses. The still video camera, which uses pixels to record reflected light, is perhaps the public's first introduction to photography's secretive transformation. Still video cameras use reflected light, but they are based on pixels and fed into computers for processing. "The knowledge about digital retouching could lead to systematic distrust of any picture and of journalism in general," observed one European researcher of how children process visual information. "Media education should be very cautious about any additional effect on an already existing trend." The dialogue should be neither a technician's secret or a Luddite's fear. In the words of Jean-Pierre Golay, we should be "aware and not cynical."[38]

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Notes

1. Susan Sontag, *On Photography,* (New York: Dell Publishing, 1977), p. 160 on William Henry Fox Talbot, inventor of the negative, who called photography "the pencil of nature;" I am grateful to insights by Professor Robert Hawkins and his Special Topics Seminar, 1988 Summer Intersession, University of Wisconsin–Madison.

2. Thomas S. Kuhn, *The Structures of Scientific Revolutions,* (University of Chicago Press, 1962), p. 175.

3. _____, "Second Thoughts on Paradigms," *The Essential Tension* (University of Chicago Press, 1977), p. 294.

4. Kuhn, *Structures of Scientific Revolutions,* p. 22; Beverly M. Bethune, "A Sociological Profile of the Daily Newspaper Photographer, *Journalism Quarterly* 61 (Autumn 1984), p.609.

5. Sontag, pp.5–6.

6. I. Bernard Cohen, *Revolution in Science* (Cambridge: Harvard University Press, 1985) p. 23; Thomas L. Haskell, "Deterministic Implications of Intellectual History," *New Directions in American Intellectual History* (Baltimore: Johns Hopkins University Press, 1979), p. 140.

7. Neil Harris, "Iconography and Intellectual History: The Half–Tone Effect," *New Directions in American Intellectual History* (Baltimore: Johns Hopkins University Press, 1979), p. 202; Sontag, p. 129; Beaumont Newhall, *The History of Photography from 1839 to the Present,* rev. ed., (New York: Museum of Modern Art, 1982).

8. Harris, p. 209.

9. Susan Roman, "Photography in a Computerized World," *Photo District News,* (January 1989), p. 26; Tom Hall, "Images of the Future," *Photo District News* (January 1989), p. 20.

10. Rocco Alberico, art director, *Sports Illustrated for Kids,* telephone interview, March 21, 1989; Mark Lapin, "Dangers and Delights of the Digital Domain," *Photo District News,* May 1989, p. 23.

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14. Daniel Cohen and Karen Benezra, "Digitzed News: How Real?", *Photo District News* (May 1987) from *The Electronic Revolution in News Photography: A NPPA National Report,* edited by Michael L. Morse (National Press Photographers Association, 1987), p. 63; David Ansley, "What's Wrong with this Picture?" *San Jose Mercury News,* Feb. 7, 1989; Clare Ansberry, "Alterations of Photos Raise Host of Legal Issues," *Wall Street Journal,* Jan. 26, 1989.

15. Diana La Guardia, art director, *Conde Nast's Traveler,* telephone interview, March 15, 1989; Graydon Carter, editor, *Spy,* telephone interview, March 14, 1989; Bob Furstenau, director of production, Meredith Corporation, telephone interview, March 16, 1989.

16. Furstenau interview; *San Jose Mercury News; Wall Street Journal;* Shiela Reaves, "Digital Alteration of Photographs in Magazines: An Examination of the Ethics," unpublished research paper presented to Association of Education in Journalism and Mass Communication, August 1989, Washington, D.C.

17. Larry Nighswander, illustrations editor, *World,* telephone interview, March 16, 1989; Furstenau interview.

18. Michele Stephenson, picture editor, *Time,* telephone interview, March 14, 1989.

19. William T. McGrath, "Computer Imaging and the Copyright Laws," *Photo District News* (March 1989), p. 60; *Wall Street Journal.*

20.Kathleen Auddy, "ASMP Chapter President Vince Streano Talks About Perils of New Technology," *F/10 Forum,* (March 1988), p. 54.

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22. Staci Kramer, "The Case of the Missing Coke Can: Electronically Altered Photo Creates a Stir," *Editor and Publisher* (April 29, 1989), p. 18–19.

23. Graydon Carter interview; Mary Carroll Marden, picture editor, *People Weekly*, telephone interview, March 21, 1989.

24. Marden interview.

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33. George Garneau, "The Competitive Picture Business," *Editor and Publisher* (Nov. 19, 1988), p. 14.

34. *Wall Street Journal;* Caroline Dow, "Prior Restraint on Photojournalists," *Journalism Quartherly,* 64 (Spring 1987), p. 93.

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36. Kuhn, p. 209.

37. I am grateful for conversations with Tom Bentkowski, director of design, *Life* magazine.

38. Jean–Pierre Golay, Visiting Fellow, "Aware and Not Cynical," unpublished paper, February 1989, School of Journalism and Mass Communication, University of Wisconsin–Madison.